

IN THE DRAWINGS

The attached sheets of drawings include changes to Figs. 1-3, 4A, and 4B. These sheets, which include Figs. 1-3, 4A, and 4B, replace the original sheets including Figs. 1-3, 4A, and 4B.

Attachment: Replacement Sheets

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-5 and 7-18 are currently pending. Claims 1-5 and 7-18 have been amended; and Claim 6 has been canceled without prejudice or disclaimer by the present amendment. The changes to the claims are supported by the originally filed specification and do not add new matter.¹

In the outstanding Office Action, the Abstract was objected to as containing an informality; Claim 5 was objected to as containing various informalities; the Drawings were objected to as containing informalities; Claims 1-4, 6, 10-12, 14, and 18 were provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over Claims 1-12 of copending Application No. 11/020,192 (hereinafter “the ‘192 application”); Claims 1-9 and 11-17 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Publication No. 2004/0028004 to Hayashi et al. (hereinafter “the ‘004 publication”); and Claims 10 and 18 were rejected under 35 U.S.C. §103(a) as being unpatentable over the ‘004 publication.

In response to the objections to the drawings, Applicants have amended Figures 1-3, 4A, and 4B to include the legend “BACKGROUND ART”. Accordingly, the objections to the drawings are believed to have been overcome.

In response to the objection to the Abstract, the Abstract has been amended to address the informality noted in the Office Action. Accordingly, the objection to the Abstract is believed to have been overcome.

¹ See page 26, line 1 through page 31, line 19 of Applicants’ specification.

In response to the objection to Claim 5, Claim 5 has been amended to address the informalities noted in the Office Action. Accordingly, the objection to Claim 5 is believed to have been overcome.

Amended Claim 1 is directed to a radio communication system for performing a radio communication by combining the OFDM modulation method and the CDMA modulation method, the system comprising: (1) a transmitter apparatus configured to estimate conditions of propagation paths used in the radio communication, select an arrangement pattern based on the estimated conditions of the propagation paths, arrange information symbols along the direction of the frequency axis in accordance with the selected arrangement pattern, and transmit a radio communication signal including the arranged information symbols; and (2) a receiver apparatus configured to receive the radio communication signal, and rearrange the information symbols included in the radio communication signal along the direction of the frequency axis in accordance with a reverse pattern to the arrangement pattern.

Regarding the provisional rejection of Claim 1 on the ground of non-statutory obviousness-type double patenting, the '192 application is directed to a radio communication system having a radio transmitter and radio receiver, the system adopting multiple carrier modulation and code spreading modulation methods. In particular, the '192 application recites a selecting unit provided in the radio transmitter or the radio receiver, for selecting an interleaving mode out of a plurality of interleaving modes depending on radio propagation path conditions; whereby the symbol configuration unit configures information symbols to be transmitted by the radio transmitter in both time and frequency directions in a pattern according to the interleaving mode.² However, Applicants respectfully submit that the '192 application fails to disclose selecting an arrangement pattern based on the estimated conditions of the propagation paths and arranging information symbols along the direction of

² The '192 application, see Claim 1, lines 5-23.

the frequency axis in accordance with the selected arrangement pattern. Accordingly, Applicants respectfully submit that the rejection of Claim 1 on the ground of non-statutory obviousness-type double patenting should be withdrawn.

Regarding the rejection of Claim 1 under 35 U.S.C. §102(e), the '004 publication is directed to a radio communication system with an adaptive interleaver. The '004 publication discloses bit interleaving, symbol interleaving, and chip interleaving.³ In particular, the '004 publication discloses a radio communication system with adaptive interleaving which selects between chip interleaving and bit interleaving depending upon the number of active code signals.⁴ The features disclosed by the '004 publication are as follows: the first selector selects the output from the bit interleaver if the number of active codes is greater than a predetermined value, and the second selector selects the output from the chip interleaver if the first selector does not select the output from the bit interleaver.⁵ Further, the '004 publication discloses that the predetermined value is set based on the average received signal quality, S/N, and BER (SER), and is updated in response to the received signal quality, S/N, the speech quality, and BER (SER).⁶

However, Applicants respectfully submit that the '004 publication fails to disclose a transmitter apparatus configured to estimate conditions of propagation paths used in the radio communication, select an arrangement pattern based on the estimated conditions of the propagation paths, arrange information symbols along the direction of the frequency access in accordance with the selected arrangement pattern, and transmit a radio communication signal including the arranged information symbols. Rather, the '004 publication discloses that the transmitter and the method may either always perform interleaving on a received signal, and then either select or not select the interleave signal, or the transmitter could disable the

³ The '004 publication, see paragraph [0025].

⁴ The '004 publication, see Abstract.

⁵ The '004 publication, see Claim 1 and paragraphs [0029, 0032].

⁶ The '004 publication, see paragraph [0040].

interleaver, and not perform interleaving when the number of active code signals is less than a predetermined value.⁷ Further, as discussed above, the '004 publication discloses selecting bit interleaving or chip interleaving in response to a comparison between the number of active codes and the predetermined value. The '004 publication discloses that the number of active codes generally is related to the number of users.⁸ The '004 publication does not disclose that the transmitter selects an arrangement pattern based on estimated conditions of the propagation paths and arranges information symbols along the direction of the frequency axis in accordance with the selected arrangement pattern. Accordingly, Applicants respectfully submit that Claim 1 patentably defines over the '004 publication.

Amended Claims 2 and 3 recite limitations analogous to the limitations recited in Claim 1. Moreover, Claims 2 and 3 have been amended in a manner analogous to the amendments to Claim 1. Accordingly, for reasons analogous to the reasons stated above for the patentability of Claim 1, Applicants respectfully submit that the rejections of Claims 2 and 3 (and dependent Claims 4 and 10) on the ground of non-statutory obviousness-type double patenting should be withdrawn. Moreover, Applicants respectfully submit that Claims 2 and 3 (and dependent Claims 4, 5, and 7-9) patentably define over the '004 publication..

Amended Claim 11 is directed to a receiver apparatus used in a radio communication system for performing a radio communication by combining the OFDM modulation method and the CDMA modulation method, wherein the receiver apparatus is configured to receive a radio communication signal including information symbols arranged along the direction of the frequency axis in accordance with an arrangement pattern that is selected according to estimated conditions of propagation paths from a transmitter, select a reverse pattern to the arrangement pattern, and rearrange the information symbols included in the radio

⁷ The '004 publication, see paragraph [0036].

⁸ The '004 publication, see paragraph [0008].

communication signal along the direction of the frequency axis in accordance with the selected reverse pattern.

Regarding the provisional rejection of Claim 11 on the ground of non-statutory obviousness-type double patenting, the '192 application is directed to a radio communication system having a radio transmitter and radio receiver and adopting multiple carrier modulation and code spreading modulation methods. In particular, the '192 application recites a selecting unit for selecting an interleaving mode out of a plurality of interleaving modes; and a symbol reconfiguration unit for reconfiguring the received information symbols in both time and frequency directions in an inverse pattern of the pattern.⁹ However, Applicants respectfully submit that the '192 application fails to disclose selecting a reverse pattern to the arrangement pattern, and rearranging the information symbols included in the radio communication signal along the direction of the frequency axis in accordance with the selected reverse pattern. Accordingly, Applicants respectfully submit that the rejection of Claim 11 (and dependent Claims 12, 14, and 18) on the ground of non-statutory obviousness-type double patenting should be withdrawn.

Regarding the rejection of Claim 11 under 35 U.S.C. §102(e), the '004 publication is directed to a radio communication system with an adaptive interleaver. In particular, the '004 publication discloses that a receiver includes various types of interleavers or deinterleavers to reverse the interleaving affected in the transmitter.¹⁰ However, Applicants respectfully submit that the '004 publication fails to disclose a receiver apparatus configured to receive a radio communication signal including information symbols arranged along the direction of the frequency access in accordance with an arrangement pattern that is selected according to estimated conditions of propagation paths from a transmitter, select a reverse pattern to the arrangement pattern, and rearrange the information symbols included in the radio

⁹ The '192 application, see Claim 10.

¹⁰ The '004 publication, see paragraph [0025].

communication signal along the direction of the frequency access in accordance with the selected reverse pattern. Rather, the '004 publication discloses selecting an output of a deinterleaver based on a control signal that is received from the transmitter that indicates the type of interleaving that was performed on the transmitted RF signal.¹¹ The '004 publication does not disclose that the receiver selects a reverse pattern to the arrangement pattern and rearranges the information symbols included in the radio communication signal along the direction of the frequency access in accordance with the selected reverse pattern. Accordingly, Applicants respectfully submit that Claim 11 (and dependent Claims 12-17) patentably define over the '004 publication.

Furthermore, Applicants respectfully submit that the rejections of dependent Claims 10 and 18 are rendered moot by the present amendment to the independent claims.

Thus, it is respectfully submitted that independent Claims 1-3 and 11 (and all associated dependent claims) patentably define over the '004 publication.

Consequently, in view of the present amendment and in light of the above discussion, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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¹¹ The '004 publication, see paragraph [0037].